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Ling Chen

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EXAMINER

CHEN, KEATH T

ART UNIT

PAPER NUMBER

1792

MAIL DATE

DELIVERY MODE

06/18/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/700,328	Applicant(s) CHEN ET AL.	
	Examiner Keath T. Chen	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 May 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-31 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. The claim amendment filed on 05/23/2008, addressing claims 1-31 rejection from the non-final office action (03/18/2008), by amending claim 20 is acknowledged and will be addressed below.

Specification

2. The disclosure is objected to because of the following informalities: the new claim 20 limitation “an ultrasonic transducer and a mass flow meter” is not disclosed. See applicant’s specification [0030], for example.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claim 20 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. Claim 20 recites “comprises an ultrasonic transducer and a mass flow meter” while in the specification, [0030], for example, “an ultrasonic transducer or a mass flow meter” is disclosed.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35 U.S. Code not included in this action can be found in a prior Office action.

4. Claims 1, 3-11, 13-19, 21-23, and 25-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iseki et al. (US 6174371, hereafter '371), further in view of Gomi (US 5288325 A, hereafter '325).

'371 teaches the limitations of:

Claim 1: An apparatus (Fig. 2) for controlling delivery of a precursor from a vessel (#10, vaporizer) to a process chamber (#50), comprising: a first carrier gas (the lower N2) flowing into the vessel, whereby the first carrier gas is combined with the precursor (treating liquid, col. 7, lines 45-46); an output (#14) from the vessel in fluid communication with the process chamber; a second valve (#41; Figure 1; column 8, line 34) adapted to regulate a second carrier gas (the upper N2) flowing to the process chamber (through mixer #38) whereby the first and second carrier gases and the precursor are combined to form a process gas, and a controller (#72).

Claim 11: A system comprising: a process chamber (#50); a gas delivery system (#30) adapted to deliver a precursor from a vessel (#10) containing the precursor to the process chamber via a process gas produced by flowing a first carrier gas (the lower N2) into the vessel and combining the first carrier gas with a second carrier gas (the upper N2) flowing through a bypass around the vessel (as shown in Fig. 2, the upper N2 does not flow through #10); and an integral controller (#72; col. 10, lines 11-15).

Claim 23: An apparatus for delivering of a precursor from a vessel (#10) to a process chamber (#50), comprising: a first carrier gas (the lower N₂) flowing through an input (#13) into the vessel; an output (#14) from the vessel in fluid communication with the process chamber; a second valve (#41; Figure 1; column 8, line 34) to regulate a second carrier gas (the upper N₂) flowing to the process chamber; a process gas comprising the first carrier gas, the second carrier gas and the precursor; and a controller (#72).

Claim 13: A second valve (#41; Figure 1; column 8, line 34) controls the second carrier gas.

Claims 3 and 5: The controller is configured to adjust the second valve (#41, label at bottom of Fig. 2; column 8, line 34).

Claims 14 and 16: The integral controller is configured to adjust the second valve (#41; label at the bottom of Fig. 2; column 8, line 34).

Claim 4: The controller is configured to adjust a temperature of the vessel to change the concentration of the precursor in the process gas (heater #12 connected to main controller #72, col. 8, line 65 to col. 9, line 5). When the structure recited in the reference is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent (In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977); MPEP 2112.01).

Claim 15: The integral controller is configured to increase a temperature of the vessel to increase the concentration of the precursor in the process gas. When the structure recited in the reference is substantially identical to that of the claims, claimed

properties or functions are presumed to be inherent (In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977); MPEP 2112.01).

Claim 25: The controller is configured to increase a temperature of the vessel to increase the concentration of the precursor in the process gas. When the structure recited in the reference is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent (In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977); MPEP 2112.01).

Claim 7: The second valve (41; Figure 1; column 8, line 34) is adjustable to maintain a constant flow of the process gas (the valve is adjustable, and the apparatus is capable of being adjusted to maintain a constant flow rate of the process gas. Applicant's claim requirement of "adjustable to maintain a constant flow of the process gas" is a claim requirement of intended use in the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter, 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963); MPEP 2111.02).

Claim 27: The second valve (#41; Figure 1; column 8, line 34) adjusts to maintain the process gas constant (the apparatus is capable of adjusting to maintain a constant

flow rate of the process gas). Applicant's claim requirement of "to maintain the process gas constant" is a claim requirement of intended use in the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter, 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

Claim 18: The second valve (41; Figure 1; column 8, line 34) is adjusted to maintain a constant flow of the process gas (the apparatus is capable of adjusting to maintain a constant flow rate of the process gas, moreover, this is intended use). Applicant's claim requirement of "is adjusted to maintain a constant flow of the process gas" is a claim requirement of intended use in the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter, 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152

USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

Claims 8, 19, and 28: “The first carrier gas and the second carrier gas are the same” (N2, moreover, this is intended use).

Claims 9, 21 and 30: “The first carrier gas and the second carrier gas are nitrogen.” (Moreover, this is intended use).

Claim 10, 22, and 31: Applicant’s *claims requiring a specific gas identity in the pending apparatus claims* are claim requirements of intended use of the *pending apparatus claim*. It has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. Ex parte Masham, 2 USPQ2d 1647 (1987).

‘371 further teaches the main controller #72 controls the partial pressure of treating liquid through adjusting flow control valve #39 (col. 9, lines 9-13), which requires a partial pressure sensor. ‘371 further teaches the partial pressure of the vapor of treating liquid may be adjusted by the treating liquid supply (col. 14, lines 58-65), in addition to the adjustment of diluting gas (using valve #41).

‘371 does not explicitly teach the other limitations of:

Claim 1: A first valve adapted to regulate the first carrier gas, a gas analyzer having an ultrasonic transducer or a mass flow meter adapted to generate a signal

indicative of a concentration of the precursor in the process gas; and a controller configured to calculate a mass flow rate of the precursor based on the signal.

Claim 11: A precursor monitoring apparatus disposed between the process chamber and the vessel, wherein the precursor monitoring apparatus has a gas analyzer to generate a signal indicative of a concentration of the precursor in the process gas or the signal is indicative of the flow rate of the precursor; and an integral controller to receive the signal.

Claim 23: A first valve to regulate a first carrier gas, a gas analyzer to generate a signal indicative of a concentration of the precursor in the process gas or indicative of a process flow rate; and a controller to receive the signal and is configured to maintain the concentration of the precursor and the volume flow rate of the process gas constant by adjusting the first valve and the second valve.

Claim 13: A first valve controls the first carrier gas.

Claims 3 and 5: The controller is configured to adjust both the first valve and the second valve while maintaining the process gas with a constant flow.

Claims 14 and 16: The integral controller is configured to adjust both the first valve and the second valve while maintaining the process gas with a constant flow.

Claim 6: The first valve is adjustable to increase or decrease the concentration of the precursor in the process gas.

Claim 26: The first valve adjusts to increase or decrease the concentration of the precursor in the process gas.

Claim 17: The first valve is adjusted to increase or decrease the concentration of the precursor in the process gas.

Claim 29: a gas analyzer is selected from the group consisting of ultrasonic transducers, infrared spectroscopy, ultraviolet spectroscopy, gas chromatography, mass spectroscopy, mass flow meter, and combinations thereof.

'325 is an analogous art in the field of liquid vaporizer (abstract), particularly in providing a stable flow rate of raw material (col. 1, lines 65-67), similar to the problem '371 is solving for a stable atmosphere without re-condensation (col. 2, lines 13-19). '325 provides a valve (#45; Fig. 4) for the carrier gas to the liquid source (#53). '325 further provides a gas analyzer (thermal conductivity sensor #46; mass flow meter #44 and controller #47, together, makes a gas analyzer; Figure 4, col. 4, lines 14-29) having a mass flow meter (#44). The gas analyzer (#46+#44+#47; Figure 4) adapted to generate a signal indicative of the concentration of the precursor (col. 4; lines 14-25).

At the time the invention was made, it would have been obvious to a person having ordinary skill in the art to have added Gomi's gas analyzer (#44+#47+#46; Fig. 4) to the apparatus in Fig. 2 of '371.

Motivation have added Gomi's gas analyzer (#44+#47+#46; Fig. 4) to the apparatus of '371 is to adjust the treating vapor mixture (in addition to the adjustment of the diluting gas) to a specific liquid vapor partial pressure profile, as taught by '371 (col. 14, lines 58-65), with a reasonable expectation of success. This combination would

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have the capability of providing constant flow rate of process gas at specific concentration or partially pressure profile.

5. Claims 2, 12, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over '371 and '325, further in view of Renken et al. (US 4685331, hereafter '331).

'371 and '325, together, teach all limitations of claims 1, 11, and 23. '371 further teaches the system is pulsed (col. 10, lines 11-15).

'371 and '325, together, do not teach the limitation of:

Claim 2: The controller is configured to adjust both the first valve and the second valve (41; Figure 1; column 8, line 34) while the precursor is pulsed into the process chamber at a time period within a range from about 0.01 seconds to about 5 seconds.

Claim 12: The integral controller is configured to adjust both the process gas to be pulsed into the process chamber at a time period within a range from about 0.01 seconds to about 5 seconds.

Claim 24: The precursor is pulsed into the process chamber at a time period within a range from about 0.01 seconds to about 5 seconds.

'331 is an analogous art in the field of mass flow meter for liquid or gas (field of the invention), particularly in highly accurate flow measurement (col. 2, lines 12-15), which meets the need of '371 for adjusting partial pressure of the vapor of treating liquid (abstract, last sentence). '331 provides a sensor/valve assembly with response time less than 0.06 seconds (Fig. 1, col. 3, lines 20-23).

At the time the invention was made, it would have been obvious to a person having ordinary skill in the art to have adopted the sensor/valve assembly as taught in '331 to the apparatus of Fig. 2 of '371.

Motivation would have been to accurately adjust the treating liquid and the adjustment of the diluting gas to a specific liquid vapor partial pressure profile, as taught by '371 (Fig. 3, col. 9, lines 8-23 and col. 14, lines 58-65), with a reasonable expectation of success. The above combination would have the capability of pulsing from 0.06 seconds rate and up.

6. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over '371 and '325, further in view of Yoshioka et al. (US 6074487, hereafter '487).

'371 and '325, together, teach all limitations of claims 1, 11, and 23. '325 teaches a mass flow meter (#44, Fig. 4).

'371 and '325, together, do not teach the limitations of:

Claim 20: The gas analyzer comprises an ultrasonic transducer and a mass flow meter.

'487 is an analogous art in the field of vaporizer (abstract), particularly in accurate concentration of mixed liquid (abstract), which meets the need of '371 for adjusting partial pressure of the vapor of treating liquid (abstract, last sentence). '487 provides a ultrasonic vibrator/transducer (#207, Fig. 13, col. 9, lines 62-67).

At the time the invention was made, it would have been obvious to a person having ordinary skill in the art to have replaced the vaporizer #10 in Fig. 2 of '371 with

the vaporizer in Fig. 13 of '487. Therefore, having an ultrasonic transducer and a mass flow meter (combined with #44 of '325) which make up for the gas analyzer.

Motivation to replace with '487's vaporizer would have been to deliver the concentration of liquid mixture accurately, as taught by '487 and required by '371.

Response to Arguments

Applicant's arguments filed 05/23/2008 have been fully considered but they are not persuasive.

7. In regarding to 35 USC 103(a) rejection of claims 1, 3-11, 13-23, and 25-31 based on Iseki et al. ('371) and Gomi ('325), see page 7 to the first paragraph of page 11, applicant arguments are: a) there is no motivation to combine '371 that controls the temperature of the process gas with '325 that adjust flow rate of the carrier gas; and b) that because '325's sensors are placed near the vessel #42 in Fig. 4 of '325 (last paragraph of page 9), one of the ordinary skill in the art would only place the sensor near the vessel #11 in Fig. 2 of '371 (the top of page 10).

These arguments are not found persuasive because:

a) In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re*

Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the motivation is “to adjust the treating liquid (in addition to the adjustment of the diluting gas) to a specific liquid vapor partial pressure profile, as taught by ‘371 (col. 14, lines 58-65)” in the third paragraph of page 8 in the previous office action.

Applicant is dividing vaporizer technology into two sub-categories and asserting a person of ordinary skill in the art would work on one or the other, but not both. The examiner believes a person having ordinary skill in the art would consider all aspects of vaporizer functions to make the vaporizer work and work better.

b) The motivation to combine, as taught by ‘371 is “the partial pressure ratio of the vapor of the treating liquid in the treating vapor mixture may be varied by adjusting the mixing quantity of the vapor of the treating liquid while maintaining the mixing quantity of the diluting gas constant. As a further option, the mixing quantities of both the vapor of the treating liquid and the diluting gas may be adjusted” (col. 14, lines 58-65). Note the treating vapor mixture is #30 in Fig. 2, the vapor mixture leading into the treating chamber, not merely a branch out of the tank #11.

Contrary to applicant’s assertion, the examiner believes that a person having ordinary skill in the art would not have placed the sensors of ‘325 near tank #11 (in inlet and outlet pipes) because this would not have provided useful concentration information to the “treating vapor mixture”. Instead, a person having ordinary skill in the art would have known that sensor can be placed at different locations (between #41 and #55, for example) and still function. The placing of an additional MFC and sensor at the second nitrogen input (upstream of #39) would have been obvious to a person having ordinary

skill in the art (from mass balance: sum of inputs = sum of outputs). By adding these three sensors #46 along with two MFCs #44 and one controller #47 to Fig. 2 of '371 would have been one of the several possible solutions to vary the partial pressure ratio of the "treating vapor mixture" into the treating chamber.

8. In regarding to various dependent claims, applicant's argument is based on the patentability of the parent claims. Since the parent claims are found not patentable, all dependent claims are not patentable.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Keath T. Chen whose telephone number is 571-270-1870. The examiner can normally be reached on M-F, 8:30-5:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/K. T. C./
Examiner, Art Unit 1792